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MAN IN SPACE: A TOOL AND PROGRAM FOR THE STUDY OF SOCIAL CHANGE

By

MARGARET MEAD, DONALD N. MICHAEL, HAROLD D. LASSWELL and LAWRENCE K. FRANK

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*This series of papers is the result of a symposium on *Man in Space: A Tool and Program for the Study of Social Change* held by the Section of Anthropology of The New York Academy of Sciences, October 28, 1957.

PREFACE

By

MARGARET MEAD

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and

The American Museum of Natural History, New York, N. Y.

This publication examines the relationships between social and cultural change and the evolution of man in space (MIS). The planning that preceded the meeting held on October 28, 1957 on which this publication is based illustrates the problem dealt with here, namely, how to organize ongoing research into the processes of sociocultural change associated with the cumulative impacts of MIS on the cultures of the United States and other countries.

Donald Michael, through his simultaneous interest in problems of mass communication and of advanced technology, had become increasingly aware of the importance of starting research on this new development in human history, as well as of mankind's unique opportunity to watch a momentous cultural alteration during its actual occurrence. In August 1955, Michael sent a memorandum on this subject to a group of natural and social scientists and humanists, many of them unknown to him except through their writings. His circular presented the argument now embodied in his paper in this publication, and asked for a response. Encouraged by some of the replies he received, although they were discouragingly balanced by replies from others who saw no role for the social sciences in observing this new human adventure, Michael requested the American Association for the Advancement of Science, Washington, D.C., to organize a planning conference that would elaborate a research and organizational design. The Association's Executive Board authorized such a meeting, which was to have been held in New York with the cooperation of The New York Academy of Sciences. When the invitations went out, however, we encountered a difficulty besetting all pioneer work today. The very people we needed for this conference on the cultural impacts of space were already, not in outer space, but so widely dispersed over the face of the earth on various comparable missions that we could not get them together on the appointed date. This was all the more discouraging in view of the vague but rapidly approaching deadline imposed by the coming satellite launchings.

The meeting planned by The American Association for the Advancement of Science was postponed and two symposia were planned. The first was held on September 3, 1957, at the annual meeting of the Ameri-

can Psychological Association, Washington, D.C., and was sponsored by the Society for the Psychological Study of Social Issues, Chicago, Ill. Papers on the subject "Man into Space: A New Tool for the Study of Social Change" were presented by Leo Bogart, Herbert A. Krugman, Stephen Withey, and Donald Michael, who also conducted the meeting. The second symposium was the meeting of the Anthropology Section of The New York Academy of Sciences already mentioned.

Meanwhile, Michael continued his individual efforts to have questions about satellites included in public opinion polls and surveys prior to the launching of any satellites. He discussed the urgency of this research at a business meeting of the American Association for Public Opinion Research held in Washington on May 12, 1957. He also published an article, "Man-into-Space: A Tool and Program for Research in the Social Sciences," in the June 1957 issue of *The American Psychologist*. These efforts resulted in a few offers of volunteer help, along with a presatellite study volunteered by Sidney Hollander, Jr., Associates in Baltimore, Md. At the same time a certain amount of relevant information has been collected in connection with pilot research by the American Association for the Advancement of Science. This information was published in the August 20, 1957 issue of *Science* under the title, "The Image of the Scientist among High School Students."

The invitations to special guests for the meeting of October 28 were mailed on October 4 – a few hours before the announcement that the Union of Soviet Socialist Republics had successfully launched a satellite. Over the week end of October 5, Michael and I worked through the medium of the Institute for Intercultural Studies, New York, N.Y., to mobilize volunteers for rapid interviewing and for immediate monitoring of the initial mass-media responses to the Soviet satellite. Replies from individual behavioral scientists in the United States and Canada were prompt. As a result we now have a mass of material on the immediate response to the first satellite. Although this is less than we should have had, it provides at least a base on which future research can build. Many efforts were made to have questions included in market research and public opinion surveys that were almost ready for use. We found, however, that the manner in which such surveys are organized prevents their usefulness for projects of this sort, thus demonstrating the necessity for a special center that can do active advance planning. At present, then, we have one presatellite study, a collection of variously conceived and executed post-Sputnik I studies, and a smaller amount of material collected independently by the American Institute of Public Opinion, Princeton, N.J. This research is late, very late, but not yet too late.

It is especially appropriate that Michael's introductory paper on the immediate research and planning aspects of MIS is followed by the papers of two speakers who have been conspicuously associated with applying the insights of behavioral sciences to man's theoretical analysis of and practical control over his situation. L. K. Frank has initiated, planned the organization and financing of, and provided forms of institutionalization for, a great part of our advanced research on child development, mental health, psychosomatic medicine, and the methods of interdisciplinary research. Harold Lasswell has been in the forefront of those designing and advocating relevant planned research in the field of political science.

These three papers address themselves to rather different, though supplementary, aspects of the problem of studying cultural changes brought about by the impact of MIS. One clear conclusion emerges: there is a place in this field for a formal program that can provide a clearing house and stimulate and help plan research.

We have no exact models for such an organization, but partial models can be found in an organization set up by former President Herbert Hoover for the study of recent social trends; in the work of the National Resources Planning Board, Washington, D.C., and from three World War II organizations of research, the one set up for the University of California study of Japanese evacuation, detention, and resettlement and the Committee on Food Habits of the National Research Council and the Ethnogeographic Board, both of which were located in Washington, D. C. These are only partial models because the scope, duration, and significance of MIS demand a design appropriate to the mid-Twentieth Century. This design will have to be worked out in consultation with those widely varied organizations and institutions that would both support and be serviced by such a research program. The following papers and the concluding summary and recommendations spell out some of the requirements for an adequate organization.

The meeting reported here is thus an orderly expression of our customary American procedures for translating individual imagination and initiative into organized endeavor. It is to be hoped, however, that it represents the end of such individual and informal efforts and the beginning of a systematic program in the study of the impact of MIS on our changing culture.

MAN IN SPACE: A TOOL AND PROGRAM FOR THE STUDY OF SOCIAL CHANGE*

By

Donald N. Michael

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There are occasions in the life of a society when a radical invention, either artifact or concept, has basically altered the values, beliefs, and physical behavior of the members of that society. The processes of these alterations and the conditions under which they occur have always been in one way or another a basic area of study for all the social sciences. We have speculated on how a radical invention is absorbed, altered, or rejected with respect to the capacity of recipients to integrate the invention into their pre-existing values, beliefs, and physical behavior, or by their capacity to contrive new values, beliefs, and ways of behaving to meet the perceived demands of the new invention. We have partial and disjointed studies on facets of these processes as they occur in our own culture as well as in less complex ones. However, we have never had the opportunity to undertake as widely varied a systematic series of studies as we should like, both in depth and over a period of time ample for tracing out the evolution of the differential impacts of a radical invention.

The launching of the first earth satellites provides us with the opportunity to initiate an unparalleled series of such studies. We have the opportunity to follow the long- and short-term evolution of behavior, values, and beliefs as they either differentiate or die out not only under the influences or related physical inventions, for example, when the unmanned satellite becomes a manned one, but also under the influences of such factors as information sources, subculture characteristics, age, and education. We can study this evolution as it actually occurs instead of after the fact, as we have been forced to do until now, when so many of the questions to which we need answers in order to understand the processes of change could only be formulated, not answered. Perhaps the most important aspect is the fact that for the first time in history we can make detailed studies of such factors as the states of mind, values, and fantasies of chosen populations before those populations are exposed to a new de-

*I refer in this paper to the complex of activities related to the exploration and exploitation of the universe outside of our earthly oxygen envelope as "man in space" (MIS). I do not call these activities "space travel," for example, because space travel as such is only one aspect of the problem. Both space travel and an unmanned satellite are examples of the activities of MIS.

velopment, as well as thereafter. Thus we can get that first half of a before-and-after study so vital to the testing of hypotheses in all fields and so very difficult to realize in the area of social change.

This latter opportunity is largely due to the fact that unclassified information on future plans pertaining to MIS will almost always be available to researchers in this field well before it reaches the public. Prescience of this magnitude is so rare as to be almost unique. Of all disciplines the behavioral sciences can least afford to be so blind or blasé as to question this gift or ignore this unique opportunity.

Two recent opportunities were allowed to pass before much was accomplished in the way of studies before-the-fact. Both could have been intensively researched, in fact, before they happened. In the first case, that of the Soviet satellite launching, there had been considerable speculation in knowledgeable circles that the Union of Soviet Socialist Republics would try such a launching toward the end of September 1957. Moreover, as long as a year ago, Frederick Singer had calculated, on the basis of available information, that the Soviet satellite would weigh at least 100 pounds, as compared with our projected 20-pound moon. Singer is in charge of instrumentation for Project Farside.

This brings us to our second example. It had been known for many months that the United States Air Force would conduct Project Farside. At Eniwetok, a balloon was to carry a cluster of rockets to a height of about 100,000 feet. At this elevation the rockets would fire, burst through the balloon and drive on out 1000 to 4000 miles in space while sending back information on the physical characteristics of that region. This was to be our first real probe into space. Far beyond any of our previous efforts, it was both dramatic and rich in the symbolism of things to come. Yet, the general public was unaware of this exciting experiment, although certain nontechnically oriented subpublics such as the readers of *The Saturday Review* knew of it. Now Farside is completed and it has been relatively successful. Which groups have seized upon it as proving our superiority? Which have not responded to it? These are but two of the questions for which we have no answers as yet. I hope we can discover them.

Thanks to the interest of the market research firm of Sidney Hollander, Jr., Associates, Baltimore, Md., we have one presatellite-launching cross section picture of the attitudes and knowledge of Baltimoreans regarding the purposes and nature of the satellite. For financial and other practical reasons, the questionnaire was very short, which limited the variety of information obtained. The questions were open-ended, however, so that a detailed analysis should provide more insights than are evident from gross summary data. Sidney Hollander has very kindly sent me all

the raw interview material, and I hope to work it up presently. Some of the gross results follow.

One sixth of those interviewed in the sample had some understanding of the terms "artificial moon" and/or "space satellite." Men under 45 years of age were better informed than older men. Women between 25 and 44 gave correct answers more often than those either younger or older.

Most respondents who gave some satisfactory identification of the object itself were able to go further and answer two supplementary questions: "How is it that the artificial moon does not drift away or come back to earth?" and "Why do we want to send up an artificial moon?"

When asked, "Do you think it will be possible for men ever to get to the moon?" one half of the respondents answered, "Yes," while the other half were divided between those who said, "No," and those with no opinion. Men are more inclined than are women to believe space travel is possible; the younger, more than the middle-aged and older; the better educated, more than those with less formal schooling.

Reasons given for believing in the possibility of lunar expeditions were generally represented by answers such as, "Given time, they can do most anything," and, "Man's come a long way, no reason to stop now." Many of those rejecting the possibility of travel to the moon manifested a strong religious conviction against the idea, as typified by the young mechanic who said, "It wasn't meant to be; if we were supposed to be on the moon, that's where we would have been put." Definite current cultural values are implicit in these responses. We can consider, too, in what way these values are likely to change under the impact of MIS in the years ahead.

In the case of Sputnik, Margaret Mead and I, with the assistance of volunteers all over this country and in Canada, have collected answers to four open-ended questions. These should give us some picture, although by no means a complete one, of public response to the launching. One of the questions asked should have limited use for a before-and-after study of responses to Project Farside. That both this and the Hollander survey are very incomplete as base-line or even as special-purpose studies is certainly understandable, since there was no preplanned formal research program and a complete lack of funds.

Obviously we need to know much more about the state of knowledge, belief, and ignorance regarding matters pertaining to MIS, if we are to have base-line material adequate for comparison with other future studies. It is imperative that we make detailed, sophisticated, and large-scale investigations now. I have drawn up a questionnaire (see APPENDIX) that I consider minimal for a base-line study. To my knowledge no inquiries using such a questionnaire are even contemplated at present, yet

such data are clearly necessary prerequisites for future studies of trends in this area.

We can already foresee a number of further steps that it will in all probability be necessary to take as man moves into space. For some of these steps, "hardware" development and medical experiments are already under way. Along with the publicity and effort directly pertaining to each, there will be a multitude of subprojects, each claiming its share of attention. Concurrently, the opportunities for careers in these areas will multiply, and this will be reflected in the content of courses of study in secondary schools and colleges as well as in the field of career guidance.

It might be argued that national security requirements will keep most of these developments "under wraps." However, for the most part and except for short periods of time, this is most unlikely. In the first place, competition among military services, political groups, and nations will result in revelations intended to forward the interests of particular parties. In the second place, some projects, by reason of their nature, will result in publicity. For example, it would be very difficult for most nations to test an intercontinental missile without first warning international shipping out of the test areas. Moreover, instrumentation along the actual line of flight extending beyond the borders of a given country would inevitably result in intelligence leaks.

Of course, many of these projects will not be successful on the first attempt or even on the first few attempts. For instance, one reason for our building so many rockets for launching satellites during the International Geophysical Year is that not all of them are expected to orbit successfully, or even to be launched. Hence, great expectations will be built up, dashed, and built up again, which will serve to maintain popular interest over long periods.

As to a time scale for these projects, eminent authorities believe it is possible that all can be realized within the next 50 years. Others feel that any sort of manned flight to the moon is more likely to be 100 years away. Almost all agree that such flights will come and that, by any standards in this civilization, they will come soon – after all, there was less than a lifetime between Einstein's $E = MC^2$ and Hiroshima. Here then, not necessarily in the order of their occurrence, are some of the steps yet to come: first hemisphere-wide TV transmission using a satellite as the relay station; first free-fall manned rocket; first promulgation of the international law of space over nations; first successful United States intercontinental missile test; first manned short-orbiting-time satellite; first craft to be deliberately crashed on the moon; first manned long-orbiting-time satellite; first unmanned, moon-circling craft; first television transmission from moon-circling craft; first permanent research satellite

space station manned by more than one person; first manned ship to circle the moon and return; first manned ship to land on the moon and return.

Clearly, a continuous series of studies before and after the impact of these events not only would make significant contributions to our understanding of the dynamics of "social change" (or "perceptual reorganization," or "acculturation," if you will), but also would be important to those involved in action research or in applied social science. If the accelerating rate of intercultural interaction caused by economic reorganization, atomic power, and extended electronic communications is to have salutary consequences, sophisticated theory and practice must be applied to social change. Moreover, of course, man's exploration of space will profoundly alter society and its values, which will in turn affect the conduct of man's exploration of space. It is very likely that a knowledge of the public's state of mind concerning MIS will frequently be a necessary prerequisite to effective implementation of policies or programs related to MIS activities. Certainly the present close affiliation of MIS efforts and the military will have numerous ramifications. For example, it is conceivable that sometime in the future the activities of the former will no longer be compatible with the objectives of the latter. Doubtless, too, serious political considerations will present themselves when appropriations for vast expenditures for space exploration conflict with competing requests for funds for other military and social programs.

Some of the more obvious areas in which studies are needed are indicated below. Let me be perfectly clear at this point: although the knowledge to be derived from such investigations will no doubt have many uses and will be intrinsically interesting, the overriding purpose of the program is to utilize studies, in these or other areas, of the unique aspects of MIS as the *means* for devising better theories, new methods, and new hypotheses for understanding social change. Methodologically, the unique aspect of MIS is the novelty of the concepts and potential behavior associated with it. This novelty makes it a social tracer singularly distinguishable as it moves through the social body.

It must be emphasized, however, that just as a physiological tracer gives only a fraction of the potential information if one scrutinizes it only after it is distributed throughout the body instead of tracking it as it moves along, so, too, we will irrevocably lose crucial knowledge about communication patterning and social change if we wait years or, indeed, months to begin such studies. In fact, valuable knowledge has already been irrevocably lost by delaying systematic research until after the Sputnik launchings. The very few studies mentioned earlier provide a tantalizing but incomplete insight into the knowledge, values, and attitudes of different publics in the United States. The post-Sputnik studies

indicate that there is still time to trace most of the impact of MIS from almost its earliest stages. Unless these first chapters are written soon, however, they will certainly disappear beyond recovery.

The study areas proposed below are not exhaustive, nor do they outline studies of the actions of the various areas upon each other. Some of these studies would be repeated often enough through the years to give sufficient cross sections for the detection and tracing of evolutionary lines. Some studies would be one-shot affairs aimed at a detailed understanding of particular incidents. Some would be made of the population at large, others would be comparisons of subpopulations or subcultures. Studies might be undertaken by a student working, for example, on a master's thesis on an aspect of the methods of content analysis; others would require the efforts of large-scale research organizations. Whatever is studied could and should be stimulated, coordinated, and integrated in such a manner as to provide us with a unique historical record and an ever-growing source of information useful for developing and applying social science.

In the following suggestions for study areas each problem has two titles: one refers to its expression in terms of MIS studies, the other is intended to suggest its setting as a general problem in social change.

Area 1: knowledge and understanding of technical concepts associated with MIS; or, problems pertaining to the selective incorporation of technical concepts and factual information. What is the nature of the understanding of those concepts that must inevitably become part of the thinking of at least broad sections of the public as MIS becomes more and more commonplace? Such concepts are: gravity, centrifugal force, the "vacuum" surrounding the planets, weightlessness, radiations from the sun and from space, rocket engines, rocket fuels, astral navigation, and the physical and psychological attributes astronauts must possess (which may give rise to a fascinating folklore). What are the sources of such information? In what order do these various items come to be properly understood, and by which groups in the population? What distortions in understanding exist and how are they transformed into other distortions through the passage of time?

Area 2: the broad values and beliefs people entertain concerning MIS; or problems pertaining to selective changes in values and beliefs in the face of concepts and experiences that might be presumed to impinge on the preexisting values and beliefs of the subjects. What do people perceive to be, or express as, the physical, psychological, moral, ethical, and philosophical assets and liabilities for MIS, both now and in the future? How do these values change as time passes? Changing fantasies about extraterrestrial life may be of special interest. How do these fantasies alter as the time when they can be tested against reality

approaches? If such life is shown to exist, what then becomes of the fantasies? What are the positive and negative expectations of people from industrialized societies who place less emphasis on the virtue of technological progress than we do? How do these expectations evolve? Also of particular interest might be the rationalizations developed to "explain" unsuccessful launchings, as many of them are almost certain to be, or why the Russians launched a satellite first. If studies prior to specific events are available on the expectations of segments of the population, a comparison of expectations and rationalizations for failure – and their new expectations – may well prove enlightening with regard to the persistence of belief systems and the way in which information is distorted when culturally prized goals are jeopardized.

Area 3: the present and future perceptions that people have of the role of MIS in their own lives; or, problems pertaining to the growth of direct and/or vicarious physical or symbolic participation in previously nonexistent experiences and environments. When does MIS begin to have either immediate or long-term potential implications for people's personal activities and for those of their own and their neighbors' children? Does it simplify or complicate their picture of the world and their place in it? What are the current fantasies and expectations concerning the accomplishments, and especially the consequences, of the satellite launchings in 1957 and 1958? How do they change and how will they be distributed in the years after the excitement dies down? How are later patterns of fact and fancy related to present patterns?

There are two studies that could and, to my mind, should be undertaken now. Both are good examples of the sort of research that would illuminate our understanding of the processes of social change.

One of these is a survey of the attitudes, knowledge, and expectations about MIS held by scholars who are not directly associated with rocket research and related matters but whose disciplines, in principle, could be expected to be affected eventually by the consequences of MIS. These would include the historian, the behavioral scientist, the political scientist, and the biologist. In explaining why he would not attend a symposium on MIS at the American Psychological Association, one of my colleagues said that he had not come all the way from Minnesota to listen to science fiction. I wonder if he still regards it as science fiction. I wonder how many competent scholars who should know better still look upon it as science fiction? There would be merit in finding out. Of immediate interest would be the extent to which scholars are aware of or speculating about the implications of MIS for their own disciplines. Are they really more attuned to this horizon of man's efforts than the man on the street? Or do scholars have blind spots similar to those of nonscholars in general, whatever we may imply by that distinction? How do scholars compare in

perspicacity with others who are not natural scientists, such as writers, religious leaders, and politicians? Over the years, furthermore, how does MIS become significant to these groups?

A practical consequence of such a study for those interested in fostering research related to MIS would be an understanding of the nature of the educational program necessary to stimulate scholars to use this set of inputs for studying the forms of social change apposite to their own disciplines.

Another particularly intriguing research area that should offer a variety of insights into the processes of perceptual reorganization under the impact of mass communications has to do with the effects of the MIS motif in popular advertising. Variations on the MIS theme have been reasonably frequent over the last two years, and doubtless they will now increase. Here are a few typical advertisements that use variations of MIS as their theme:

An advertisement for a major department store is composed of line drawings of two women wearing space suits; there are rocket ships in the background. Exotic symbols representing extraterrestrial speech are translated as follows: "Beta-Trice! How'd you get here? Last rays I got from you, you said you were tied to your split-level astradome – and needed fresh oxygen ...."

A second advertisement shows a pen hurtling around the earth in orbit and a caption begins: "Whizzo launches the first pen designed and engineered for the atomic age! As science acts to launch a satellite into space to circle the earth ... Whizzo scientists break through every writing barrier with the atomic-engineered ...."

A third advertisement shows four people and a transparent model of the American satellite. None of them is actually looking at the model; they are looking at each other. The text reads: "Man-Made 'Moon'! Teacher and pupils alike marvel at this model of the earth satellite that, next year, scientists hope to launch out of this world 300 miles into space. BUT it's that heavenly sweater yarn that's really 'Out of this World'!"

Another presentation, this one by a major manufacturer in the missile field, combines abstract symbolism with some carefully chosen, carefully placed words ending, "...new aerodynamic forms and new applications of atomic power may within the next few years make possible the *sustained* (italics theirs) exploration of earth's upper atmosphere that will tell us what we need to know before our first human step into space."

There are numerous advertisements punning on "space" and "space travel." An example by an important manufacturer in the missile field begins: "...Automatic functions – swallowing or even breathing – will demand the space traveller's deliberate thought. Exhaled carbon dioxide may smother him. Liquids won't flow...."The copy is illustrated with an

impressionistic photograph intended to give the reader a sense of strangeness, and two photographs clarify technical points made in the text.

Another example of this type of advertisement is for a pen. This one is illustrated with a dramatic background having a look of reality intended to give the viewer a sense of other and futuristic worlds. The picture is accompanied by the caption: "Unlike any pen in this world... or any other!" Advertisements thus run from the "gimmick" approach to those that are seriously informative. We might inquire whether the symbolic content of these advertisements tends to routinize the whole subject of MIS. In other words, does this content make MIS essentially indistinguishable from the mass of complex stimuli of all sorts impinging upon, but not necessarily affecting, much of the population, or do these advertisements sensitize the viewer to the special and distinctive aspects of MIS? The fact that they generally follow the publicizing of the information or event from which the content derives means that, in principle, we should be able to learn whether information sensitizes certain readership to the symbols in the advertisements, or vice versa.

There is considerable interest in the study of cultural change by means of research on responses to MIS. The other contributors to this publication, for instance, mention specific research areas of interest to them. An article on MIS in the June issue of the *American Psychologist* presents quotations from a number of distinguished social scientists confirming their conviction that certain types of investigation could be furthered by the use of MIS material. A number of representatives of the behavioral sciences have indicated strong support for the idea. Several social scientists have volunteered their services for such studies, and some have already provided data on the Sputnik questions by means of respondents available to them or to their colleagues. Requests have been made for funds to support some fascinating studies, some from highly competent colleagues. Of course, other equally distinguished social scientists and organizations that support research have shown a singular lack of interest in this program. Nevertheless, there is substantial interest in this tool and program for the study of cultural change and it comes from sober, qualified sources. What, then, can be done to transform the verbal support into concrete research?

It is evident that, if the full potentialities of such research are to be realized, a formal organization will be necessary. In the first place, there are too many problems to be studied, hypotheses to be tested, techniques to be applied, and samples to be surveyed, to make possible the accumulation and development of a truly useful body of theory and knowledge without the assistance of some form of clearing house. In the second place, even if considerable work should, under the stimulus of these exciting times, be undertaken, it is likely to lose momentum as the

novelty and excitement fade. Again, let it be said that a sustaining organization could do much to keep interest from waning. In the third place, it cannot be emphasized too strongly that most of the before-the-fact studies on MIS will require early and efficient dissemination of information about, and interpretation of, the implications of the next step to those who may wish to conduct related research. Clearly, this can be done only if there is a formal group that includes persons apprised of such information. In the fourth place, some of the contemplated research will require substantial funds. A formal organization would have the prestige to solicit contributions successfully. It would also be a legal entity able to accept tax-deductible funds from organizations that do not assign grants to individuals, and able to subsidize specific organization-sponsored studies.

Lest there be any uncertainty regarding the intent of this paper, let me summarize those points that might be subject to misinterpretation. I do not suggest that the era of the manned space ship is almost upon us. What I do maintain is that, with the launchings of the satellites man is embarking on new experiences. These will gradually encompass more people in more ways, until eventually man and his world will be inextricably enmeshed in the activities and consequences of MIS. However, I am not suggesting a program to study MIS for its own sake. What I do claim is that, for the reasons discussed above, the subject of MIS forms an ideal tool for studying the processes of social change, acculturation, and perceptual reorganization.

Personally, I believe that such a research program is not only desirable, but also feasible. We have a responsibility to ourselves and to the social scientists who will follow us. Failure in the past to make use of such a systematic approach to the broad problem of social change seems to be compounded of four factors: (1) inadequate methods and tools; (2) the scarcity of radical inventions; (3) an inability to recognize them as such, except by hindsight; and (4) lethargy.

The investigation of social change under the impact of MIS need not be subjected to any of these limitations.

MEN IN SPACE

By

HAROLD D. LASSWELL

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The influence of scientific study on the future of space travel and migration will vary inversely with the difficulty and novelty of the conditions to be met. If it suddenly becomes technologically feasible to include other planets and satellites in ordinary airline itineraries, and if the conditions that prevail elsewhere present no serious problems, there will be little demand for advice from social scientists and psychologists. Existing decision makers and their advisors will assume that they know all the answers. They will try to extend the situation now prevailing on the earth throughout the new domain, precipitating a state of affairs resembling the race at the end of the Nineteenth Century to "open up Africa" and to bring under the effective jurisdiction of the major European powers those parts of the earth that they had failed to take over during earlier European expansion. At the end of the last century a few great powers called the tune for the lesser powers. Despite their differences, the great powers hoped to improve their positions by expanding among the weak rather than by fighting among themselves.

It would be a mistake to exaggerate the smoothness of the process. Although a full-scale European war was avoided, it was not easy for the ruling elements to impose or induce discipline upon indifferent, ambitious, or rebellious individuals and organizations within their own domains. France and Britain faced each other at Fashoda, Egypt, and elsewhere. The Germans dashed belatedly and bellicosely into the Chinese, African, and Pacific theaters of action. Russia, a state then poor in capital, was restricted to expansion in adjacent territories in Asia and southeastern Europe. Italy was throbbing with faith, hope, and little charity; and the United States found itself annexing the Hawaiian Islands and succeeding Spain in both the Caribbean and the Philippines. This last step was at the cost of a war whose scope was successfully localized and restricted.[1]

None of us expects space travel to become a reality with parallel speed and ease. Let us therefore assume that at first it will be difficult. Actually, we have no very clear idea of what lies beyond the limited probing of our telescopes. The conquest of space may come so slowly and with such a lively sense of ignorance and weakness that studies by

behavioral scientists will be welcome rays in the prevailing darkness. It may even be that joint work among qualified investigators will be permitted on a world-wide scale under official or even private auspices.

We are considering space travel in the perspective of behavioral theory and procedure, seeking to identify problem areas and possible lines of approach. I shall comment most extensively on the selection and training of personnel. I shall raise some points about the organization and exercise of authority within the expedition, and discuss the outgoing trip, the visit, and the return. It is to be understood that my general propositions are to be read as questions, that is, as hypotheses for discussion and inquiry.

Selection and Training of Personnel

Let us assume difficult conditions of outgoing travel. Suppose that the cubic feet of air space available to each passenger are severely restricted and that the flight is expected to be extended. Most important of all, imagine that great uncertainty exists about the chances of a successful landing on target and, if a landing is achieved, about the conditions to be met there. Actually the history of man contains considerable evidence of his cramping himself into close quarters in order to reach some destination. We have done it in arctic and antarctic exploration, crossed deserts, hacked through jungles, crawled up mountains and down gorges and caves, shot over rapids and ascended rivers of doubt. Above all, we have taken to the sea with surface ships and submarines, less for exploration than for fishing, trade, brigandage, and war.

Motivation. What have we learned? Or, at least, what have we learned that may be of use for further learning? A prime lesson is the vast importance of motivation. Internalized systems are needed for undertakings of the kind we have in mind. The individual must be willing to die if necessary. More important, perhaps, is that he understand the certainty of boredom and inconvenience, even though suffering may be problematical. Lastly, he must be prepared for the continual disappointment of his hope for either success or release.

Skill. What motivations are called for? At least one answer is obvious. There will be top priority for scientific and engineering motives, for individuals devoted to advancing the knowledge for which special skills make them competent. The expedition requires a balance of skills in traveling, in collecting scientific and technically useful knowledge, and in handling internal and external relations.

Respect. The desire for respect also stands high on the list. Youth has traditionally had a strong claim on this motivation, since young men and women who have not yet achieved success are frequently determined, ambitious, and long-suffering to a degree that scarcely seems worth-

while to one who has – in his own terms, at least – arrived. Neither the desire for deference, nor the will to sacrifice, however, is a characteristic found exclusively in the young. It would be a mistake to suppose that ambition is limited to obtaining the applause of those caught in the same historic epoch. Few of us at any age can imagine refusing an opportunity to accompany Christopher Columbus or, for that matter, an invitation to join those intrepid sailors of the Stone Age who, if some conjectures are correct, reached the New World a few millenniums ahead of the admiral.[2]

Rectitude. We must include social idealism, or a sense of responsibility for the common good, among the preferred motivations. This refers not only to relations on shipboard, where it is an obvious asset to have crew members with the capacity and willingness to consider the other man's point of view. I suggest that, in our civilization at least, a strong undertone of ethical concern is often underestimated as a source of the devotion so necessary for the acquisition and exercise of complex, dangerous, and often frustrating skills. Even our poets can say, with Emily Dickinson, "Had I a mighty gun / I think I'd shoot the human race / and then to glory run!"[3] Why do we feel that a scientist must "know sin" and strengthen the "politicians," who appear to have such a loud voice in deciding the political policies of mankind? Such reflections are by no means unknown to gifted minds, which frequently totter on the edge of embittered eccentricity. If erosions of conscience by adversity are to be prevented, the company of learned adventurers will need to be manned by men and women of unwavering rectitude.

In the past we should automatically have looked among men and women of strong religious conviction for ethically sensitive persons able and willing, for instance, to endure an Atlantic crossing in the tiny *Mayflower.* Recent years, at least, have undermined this assumption. For one thing, we saw in the concentration camps of Nazi Europe that secular convictions are also capable of carrying our fellow men through the most degrading conditions. Communists, anti-communist socialists, anarchists, even nonparty humanists and nationalists, were sometimes able to survive, often as physical cripples, although as moral giants.[4] Given the varied and frequently hostile ideologies, secular and sacred, that divide mankind, and the unwieldiness of a scheme of proportional representation, it must be inferred that men firm of social purpose, though they may be lacking in doctrinal conviction, should be selected for the expedition.

Enlightenment. An interesting question arises when we weigh the advantages of enlightenment as motivation. I am using the word to mean the pursuit of a comprehensive vision of man in the world. Enlightenment is not to be confused with specialized devotion to scientific and engineering skills, although a figure such as Descartes is a reminder of the fact

that enlightenment and specialized knowledge may flow together in the same mind. There is no necessary connection between a specialized proficiency and the pursuit of a unified and comprehensive, although tentative, image of the whole. Our first inclination may be to stress the urge to enlightenment.

In so doing, however, we might be precipitate. There are many visions of the whole, but not all of them would contribute to our project. Some interpretations of history, prehistory, and the natural world support a low estimate, not only of man's previous performance, but also of his potentialities. I propose to exclude from the initial company speculative minds of this particular bent. It is true that contemplating the most disagreeable contingencies often has a beneficial therapeutic effect, and that grumbling is a famous safety valve. It is also true that abstract speculations of the kind to which I refer are of complete indifference to many people. Under extreme conditions of stress, however, even the most indifferent person may discover that cracks are appearing in his usual schemes of thought and fantasy. The presence of a philosopher of defeat who focuses on the most adverse potentialities can hardly be expected to have no adverse effect whatever. For a precarious expedition the risk is not worth taking. If we are to include philosophers, whatever their other proficiencies may be, they should have minds that are truly open, and not minds that reveal only darkness.

Affection. A sense of responsibility can become brittle under adversity. A hedge against collapse is love. From our study of leaders we have learned that empathy – the perception of the subjective state of other people – is not necessarily connected with benevolent sentiment. The finding is confirmed by the study of various types of neurotics and psychopaths who recognize the vulnerable side of other people and mercilessly exploit their weaknesses. The expedition needs people whose capacities for giving and receiving affection are deep-rooted and who therefore possess a reserve of toleration and indulgence of others. It is to be hoped that this condition can be fulfilled and that the company can also be bound together from the beginning by a network of acquaintance and congeniality.

Well-being. Love and affection suggest the problem of sexuality. There is no time here to examine the anxiety-producing impact of the Judeo-Christian tradition upon the world. I suggest only that we include among the explorers individuals who are able to handle the physical side of sex privately without developing aggressiveness or guilt. It has apparently been traditional to avoid including husbands and wives or other permanent sex partners in expeditions whose numbers are small. We are cognizant of the unsuspected attachments and revulsions that spring up among human beings who live in proximity; and we are es-

pecially aware of the carry-overs from tensions in early childhood caused by sex partners who are audibly and frequently active in the immediate vicinity.

Physical sexuality is an aspect of the whole subject of psychosomatic well-being. A frequent aim of exploratory travel was to discover a fountain of youth, or to come across people with miraculous cures or means of enhancing potency or intelligence. Presumably this incentive will not be available for space travel unless the speculations are correct that space travelers will age less rapidly than the stay-at-homes because of the peculiarities of the time dimension.[5] Actually, the motives connected with well-being are almost overwhelmingly negative if, as we anticipate, the probability of death and discomfort must be faced.

Wealth. The lure of riches for individuals either for themselves or their families, churches, states, or trading companies has in the past performed a spectacular role in opening up the world. Today, however, governments that subsidize research and development in the field of space travel are more preoccupied with political security or dominance than with the significance of new resources for production intended to improve the standard of living. It is safe to predict that the desire for wealth will take on boom dimensions if the early flights succeed in opening new frontiers. At first, however, this motive is low in the hierarchy of effective values. We will need many specialists in the technology of production in order to assess the political use of new resources; but it will be wise to do without men who want to stake out mining, plantation, or real estate claims. Miami Beach, Mars, can be left to the second wave; so can Butte, Venus.

Power. Here we again encounter a typical trait, often called a paradox, of our civilization. Wealth and power are massive and widely distributed incentives among us. When it is a question of uncovering the mysteries of the world, however, the major personal motivations of those who do the job are far more likely to be skill and respect. Power considerations result in providing the wherewithal, but other human potentialities provide the know-how and the willingness to face physical risks.

It has already been implied that allowing the original company to contain a balanced selection of fanatics would be too dangerous. We do not want those who are identified with one social order to mutiny when the goal is in sight and try to liquidate the claims of the other side to share the newest world. There is no modern counterpart of the Fifteenth Century Pope who could draw a line – however misconceived – dividing the world between the Spanish and the Portuguese.

It would be highly desirable to agree to partition the new discoveries, assuming that a truly joint development remains out of the question. Unilateral attempts may produce clashes from the start, or set off a

race to reach various targets first, thus reproducing on a solar and galactic scale the dangerous scrambles we have seen in the past. There are a number of analyses of the contemporary structure of world affairs relevant to this issue.[6-10]

If the expedition includes emissaries of two incompatible powers who are both charged with safeguarding the execution of a partition agreement, there will be suspicion on all sides that members of the company are secretly committed to outwitting their fellows if possible. Scientists and others desiring to keep political conflicts to a minimum may try hard to have a voice in, if not to dominate, the choice of personnel and the conduct of the enterprise. Any political elite that takes the project seriously will undoubtedly seek covertly to insure its own position.

A unilateral expedition, assuming that it is not shot down, would be freer of internal political tension than would a joint enterprise.

Many power-centered personalities do not express themselves in conventional moulds of political belief and activity, but try instead to convert every human relationship into a pattern of dominance and submission. No doubt it will be sensible to exclude such types.

Variations. The history of exploration shows that the motives discussed above have existed in many combinations. There is also the liberated or paroled criminal who would rather risk death on a dangerous mission than rot in confinement. It is unlikely that we shall need to draw upon this ancient reservoir of desperation. Nor shall we make use of slaves for our motive power. We can, however, draw upon some marginal groups. Certain individuals' names are stigmatized, possibly because of family scandal or early indiscretion. Not infrequently these persons develop an iron will to vindicate themselves; and, in the absence of negative traits, they may perform brilliantly. The same point applies, although with more reservation, to persons who have violated an important norm of conduct and are genuinely penitent and eager to make restitution to society.

Past explorations. What do we actually know about the working of motivating systems under circumstances of the kind we envisage, that is, of explorers required to live isolated from others, but in close proximity to one another? I wonder, for instance, if my own strong preference for skill, respect, and open and friendly people has led me to underrate the survival importance of personality traits that seem to me to be less attractive? Is it true that under conditions of great adversity strong underlying detachment or aggressiveness makes it possible for crucial though disagreeable decisions to be made and enforced? Or does one make that assumption at the risk of falling back into the mythology that the function of leadership is imposition?

It may be possible to gain access to the inner history of enough dangerous expeditions to illuminate these perplexities. Certainly, some explorations have failed or succeeded after enduring the most severe hardships; often the critical factor appears to have been the "human equation." We know of crises in which leaders have been deposed or have succeeded in maintaining authority. Survivors of a few important expeditions are still available for further intensive interviewing.

One may be skeptical about the completeness with which past exploits have been recorded. After all, elaborate medical and aptitude reports are quite recent. Even efficient sound recordings, for instance, do not go back very far, so that it is not feasible to study vocal patterns as a clue to personality structure.*

Capability. Motivations are not the only pertinent factors in the selection of personnel for a voyage into outer space. We know that, despite thoroughly genuine motives, some individuals are incapable of maintaining self-control under certain specific physical trials. We can probably anticipate some of the physical conditions to be met by space explorers, for instance, cramped quarters, monotonous food, and monotonous visual and auditory stimulation. We can also forecast mechanical failures that would spell partial asphyxiation, bad smells, lack of toilet amenities, excesses of heat or cold, of glare or darkness; and excessive changes in pressure, noise, vibration, and pitch. Thanks to aviation psychology and medicine, we now have some ways of testing an individual's ability to endure such trials. Some of the depth patterns relating to the body-image remain elusive, nevertheless, although they are reflected in an individual's response to illness, surgical insult, mutilation, or impaired sensory-motor functioning.[13,14]

Several mechanisms of behavior, or combined motivational-mechanism patterns, seem to be of considerable direct importance in choosing volunteers for space missions. Two or three of these mechanisms are discussed below.

Mastery of the unexpected. Space explorers need to be alert and critical interpreters of novel phenomena. The awkward problem for the individual is how to encourage doubt without courting disastrous paralysis of judgment. Let us use the term "creativity" to designate that rapid reorientation of symbol processes required to meet new configurations with success. Morris Stein recently reported observations of particular relevance, since his subjects are highly trained professional people, industrial chemists.[15] Stein says that creativity is connected with the capacity to perceive the social roles played in and around the subculture of the laboratory. Creative people, it seems, also have a high toleration of ambiguity.

*For typical documents and studies of exploration, see R. Hakluyt and W. W. Hyde.[11,12]

Apathy. Ralph Greenson, psychiatrist of Los Angeles, Calif., has noted the impressive survival capability of prisoners, who could easily sink into a state of apathetic indifference to their surroundings. His attention was directed to these behavioral signs by the practical wisdom of veteran prisoners who accurately predicted which newcomers would provoke the guards and get into trouble, or commit suicide, and who would hold out to the end.[16] In several instances at least, the early childhood of those who persevered was lacking in affection. Instead of losing heart and dying – a response reported in some orphanage studies – these youngsters learned to throw themselves into a state of suspension that made it possible to go on living. Is this a clue to a basic mechanism that produces a high survival potential? If so, it may conflict with our view of the probable desirability of including persons who have received a great deal of love in their childhood.

Training. Since our methods of selecting personnel are at best highly approximate, we must rely to some extent on observing the behavior of candidates after they have been assembled for final tests and training. The mere fact that antipathies appear at the beginning of an acquaintance should not be allowed to constitute an automatic disqualification of either party. The decisive element is not the antipathy, but rather the capacity to master an unfounded response. We know that able, self-confident, and frank persons frequently pass through negative phases in relation to one another before consolidating an abiding respect and affection.

In this connection it is interesting to note that studies of successful athletic teams have reported the fact that teammates in winning combinations make fewer demands on one another for emotional support than do those in losing combinations. This comes in part from the inner satisfactions of high performance. In extreme cases it leads to the disconcerting objectivity of persons wrapped up in their skills, which may arouse resentment on the part of individuals who lack a comparable source of indulgence and seek compensation in sociability and intimacy.

"Confessors." During the preparatory period individuals should be encouraged to talk with complete candor about themselves and the trip to qualified physicians and scientists. Since candor is inhibited when the one who receives information can use it to impose deprivations upon informants, the role of the "confessors" should be agreed upon by all concerned. Confessors should have no voice in decisions concerning the exclusion of anyone from a mission. Any individual who has doubts about himself should fully explore these misgivings, and should do so on his own initiative. At the same time, it should be understood that a record for future scientific purposes is to be made by each confessor.

Outspokenness. It is questionable whether complete outspokenness should be encouraged from the start of the training period with the ex-

pectation that it would continue during the life of the expedition. Let us assume complete freedom in policy discussion. This often calls for highly personal remarks. The question is whether complete candor should be encouraged, after the manner of "criticism night" at some fraternities or group therapy sessions. Such sessions encourage adverse remarks and they may interfere with an operational, as distinct from a therapeutic, purpose. In our civilization we do in fact respect some barriers on behalf of privacy, and display resentment when they are disregarded.

The company could be transformed into a special subculture devoted to the candid disclosure of fantasies about one another as a regular pattern. There is a culture whose members spend a great deal of time interpreting last night's dreams and who are said to live in harmony.[17] There are therapists, moreover, who maintain social relations with former patients, encouraging outspokenness and other forms of acting out. In London, England, the emphasis by Melanie Klein, psychoanalyst and specialist in child development, on the psychotic character of early experience has led to a subculture of persons who continue in contact and appear to enjoy giving voice to psychotic fantasies. Religiously oriented groups are, of course, innumerable.

I believe that the persons most suitable for the initial space trips will have personality systems whose demands for privacy are such that attempts to create a subculture of personal candor would alienate them and weaken the enterprise.

Members of some expeditions have confided fully in one another when faced with almost certain death. What of expeditions in which such expectations did not produce the same response? Are there cases in which candor was later regretted? What factors actually predispose toward and away from the traditional frankness so often remarked among shipboard strangers, and also among fellow prisoners of war and politics?

The Organization and Exercise of Authority

The role of the captain. From the outset everyone should understand the applicable rules for making and executing decisions. Disaster can follow a failure to agree on the locus of authority and its manner of exercise. The expedition represents the interests of many more persons than the immediate members of the company, who are chosen principally on the basis of their ability and willingness to perform various tasks during the trip. Final decisions must be made by a person acquainted with the many interests at stake, so that his judgments can take into account the whole map of relevant interests. The captain should carry the burden of final decision.

Qualified leaders should be chosen from among individuals accustomed to exercise formal authority and effective control within the

framework of a society with a democratic tradition. Political democracy does not imply that everyone has a direct voice in every decision; but those reared in a relatively democratic body politic do expect to have a voice, unless they have agreed to its delegation, or unless emergency conditions make the polyvocal decision unwieldy and dangerous. As a working rule the captain will hold sessions of the whole company to discuss any matter of expedition policy that anyone desires to introduce. The sessions will be most effective if they are used to clarify the objectives and the factual circumstances of the company.

The captain, vice-captain, or chief executive officer need not be discussed in this paper, since the requirements of navigation are so unique that relatively few individuals will be available from whom to choose. Nor need we consider the precise balance of skills best adapted to the needs of the expedition.

Order of succession. From the beginning the order of succession to the captain's responsibility should be explicit. In military undertakings this is always well understood. Civilian operations, on the other hand, are often vague, and consequently they generate unnecessary conflicts and destructive uncertainty.

Order of expendability. In an enterprise of this kind it is helpful to know in advance the order of expendability. This will be important if supplies run out, for instance, and some members must be sacrificed. Questions of this kind are too serious to leave to the inflamed vision of crisis; they require serious consideration when minds are relatively unclouded. The company can be divided into ranks with an explicit order of importance should the enterprise encounter misfortune. Within ranks the final choice may be by lot. The mode of extermination is among the details that should be settled in advance; presumably it would be by the use of drugs.

Outgoing Trip

I shall not try to anticipate many of the problems that will arise in the course of the expedition. However, a few points are relevant as a guide to investigation of the outgoing trip, the visit, and the return.

Work. One point must be made regarding the importance of work to the health of the expedition. No one doubts that work is essential. Fortunately the scientific and engineering level of motivation and competence will be sufficiently high to guarantee that the members of the company will be self-directing in this area. Keeping records, analyzing data, reading, and reflection are likely to take up the available hours – or years.

Relaxation. With so highly cultivated a company, we cannot expect to be dealing with automatons. Some advance thought must therefore be given to problems of relaxation. It is, of course, to be hoped that quarters

will not be as cramped as they were, for instance, on board the German submarine U-977 that was navigated from the coast of Norway to Buenos Aires at the end of World War II.[18] With a crew of thirty-two the submarine stayed under water for sixty-six days; and this was before the latest alleviating gadgets had been perfected. Privacy was out of the question and boredom was intensified. More variety was possible on the high seas. On the *Atlantis* a regular feature was "leave on board," which meant isolation and relaxation in the hospital quarters. Eight days were allowed to the crew in batches of twelve.[19]

Presumably there will be extensive experimentation with orbital cities or space platforms, as well as rocket ships, before longer trips will be undertaken.

Discipline. Discipline is a matter about which much miscellaneous knowledge is available. As usual, we are handicapped by the absence of records that give a sufficiently precise picture of either those who were the targets of sanctioning measures or those who imposed them. The outcome of the disciplinary issues that arose on the U-977 is informative. When morale was at its lowest ebb a crew member stole some chocolate, a serious offense in view of the scarcity of food supplies. Also, a top officer refused to obey orders, which can lead to total disintegration. In both cases the commander, who was in charge by consent and did not depend on the vanished authority of Berlin, pronounced a condemnation and imposed a punishment that depended on the willingness of the whole company to observe a boycott, but not to go beyond it. Common goals were reaffirmed in the crisis, and the arrangements for decision making that had been previously established were validated. Actually, we know very little about the strength of the warring intensities of motivation within each personality or the pattern of interaction that would produce only three significant violations of discipline during the whole arduous journey.

The Visit

One of the most tantalizing questions, especially because it may not be settled until the expedition lands, is whether life of any kind, and especially advanced life, is to be found on the target. Fortunately, we have experience here on earth of communicating with primitive peoples. We can include in the ship's company an anthropologist-linguist with a practical as well as a theoretical turn of mind.

Communication. Would it make sense to carry a stock of slides or films designed to show where our company came from and to declare its pacific intentions? This is not as simple as it seems, since we know that the interpretation of still or moving images depends upon learning.

Can we prepare alternative sets of training films capable of providing learning experiences for forms of life at several levels of development?

Another possibility is to prepare a dummy, a robot, to make our initial contacts.

Unusual aptitudes and skills. A more novel proposal, perhaps, is to search for individuals on earth who have unusual talents and who, if otherwise acceptable, could be included in the ship's company on the chance that they would help solve the communication problem. Intellectual development elsewhere may have followed rather different lines than it has on earth. What of ESP and related phenomena the authenticity of which is still in dispute among us? If we find individuals whose aptitudes are generally attested to by those who give such abilities credence, we could do worse than take a chance on sending them. We can choose from members of the Royal Society for Psychical Research, the parapsychologists of the West, and the mystics of the East.

If cultures are simple. We need to consider in advance some questions that will arise if we should find that a landing has been made among people whose cultures we can regard as comparable with folk societies on earth. Presumably we will be sufficiently persuasive, or well-enough armed, to maintain our foothold and to leave a garrison, if a return trip is feasible. Under these conditions the members of the expedition will have time to refer to earth the questions of astropolitics that will arise. Clearly we should anticipate the sharing of responsibility, through the United Nations if possible, for the pacific development of our new neighbors. In the past we have developed a strategy of dealing with folk societies on the basis of trial and error or, to be more accurate, of our error and their trials. Perhaps we can do better next time.[20]

If civilization is similar to ours. It is also relevant to anticipate the questions that will arise if the civilization that we encounter is similar to our own. A major issue for intelligence is whether the planet is politically divided into hostile units, as is our own, or whether it is united.

If the planet, or satellite, is divided politically, with whom have we made contact? Presumably the expedition may land within the domain of a great power, a middle power, or a weak power – corresponding, let us say, to the United States, France, or Switzerland. A further question is whether the landing will have been made among outlaws or under established authority.

Our strategic moves cannot be so clearly anticipated as they would be for folk societies. To complicate things further, the local inhabitants may not allow our expedition to postpone important policy matters until we have had time to send home to earth a full, detailed, and deliberate report and wait for the wheels of decision to spin.

We must envisage the whole gamut of possible relations. Perhaps the ruling elements on the new planet will be willing to enter into peaceful intercourse with the earth. Or it may be that minority or dissident elements can be identified which, if assisted in seizing power, will adopt a policy of intercourse. Another possibility is that either a tyrannical or a free system of ideology and organization dominates the new world, or that power is divided between systems.

The ship's company may have an opportunity to become an agent of one or another new world power bloc in furthering their imperialistic designs upon the earth. A more subtle problem will appear if this world has only recently succeeded in developing a system of public order that maintains peace and freedom. What would be the consequences of bringing a divided earth into active intercourse with this system? Might it not stir old embers of disunion and violence as the minority parties and factions reached out to obtain support from earth groups? Would the members of the expedition feel justified in acting as instruments whereby new waves of discord are spread among advanced forms of life?

If civilization is scientifically superior to ours. We must not overlook the most dramatic possibility of all. Perhaps a civilization superior to ours in its mastery of science and technology has come into existence, and our expedition is permitted to land in order to obtain a specimen of life from earth. Under these conditions the members of the expedition may have no choice but to destroy themselves immediately, if they can, rather than to be made to provide information and to act as involuntary tools for reducing the earth.

However, the issue might arise in such a way as to provoke genuine conflicts of loyalty. Assume that the explorers are convinced of the stability and decency of the new world system of public order that exists alongside superlative achievements in science and engineering. Suppose that they are convinced of the militaristic disunity and scientific backwardness of earth. Is it not conceivable that the members of the expedition will voluntarily assist in a police action to conquer and unify earth as a probationary colony of the new order?

The Return

Those remaining. If it is feasible for the ship to return to earth, a principal question will be which individuals are to be left behind. We cannot at present estimate the gravity of this decision. Perhaps several expeditions will be launched at about the same time, and communication between the earth and the new world will be full and free. If we succeed in establishing friendly contact in advance with civilized inhabitants, the whole undertaking will lose much of its formidable aspect.

Should the individuals left behind find it necessary to live in a cramped garrison among hostile forces, the situation will be rather familiar. Many of the precautions discussed earlier would be justified by these adverse conditions.

Return with a visitor? One question that may come up is whether the return is to be made with a visitor on board. The significance of this will depend upon many factors, especially those connected with the level of civilization. At the lowest level the scientist's desire for specimens, or an American's desire for a souvenir, is a lively motive. If contact is made with higher civilizations the returning mission would take on an autonomous scientific and political character.

Interception? On the return journey any latent political conflict among expedition members may burst into the open. It could arise over the question of where to land on our politically divided earth.

Further, the possibility is not to be excluded that rivalry may be sufficiently intense to result in attempts at interception – at "hijacking" – on the way back.

Concluding Comment

I shall refrain from pursuing further the long-range problems that could arise in enlarging the spatial platforms, whether natural or artificial, on which life is maintained. Behavioral scientists seeking to anticipate the challenges and opportunities that the expansion of science and technology is bringing into existence need a more systematic devotion to the contextual consideration of the future.[21]

All the foregoing rests, of course, on the assumption that earth's inhabitants will be able to execute programs of the kind under discussion, which is no foregone conclusion. The implications of the unidentified flying objects (UFO)[22] may be that we are already viewed with suspicion by more advanced civilizations and that our attempts to gain a foothold elsewhere may be rebuffed as a threat to other systems of public order.

We are in no position to pass final judgment on these matters. We can, however, use all the facilities at our disposal to anticipate the issues that lend themselves to identification and clarification by the conceptions and methods currently at the disposal of the sciences of behavior. By anticipating the shape of future developments, we may be prepared for the intermediate task of meeting the long adjustment process by which earth men become accustomed to a new role in the world.

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CULTURAL IMPLICATIONS OF MAN IN SPACE

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The term "culture" is often used to indicate the arts and graces of a people and also their basic traditional beliefs and patterns. An adequate discussion of these two aspects of our theme would exceed the limits of this paper and the competence of the writer. Accordingly, I shall attempt only to suggest some of the implications of man in space (MIS) and hope that others will elaborate and extend this inquiry.

We may conceive of a culture as a design for human living that is persistently sought by members of a group, but never fully attained. This conception of culture has the merit of emphasizing that man the organism has, from his early days, been engaged in transforming nature and human nature in order to develop a human mode of life as distinguished from a purely organic existence. He continues to live and function as an organism, carrying on an incessant intercourse with his environment, but he lives in a self-created symbolic and cultural world of meanings and goal values that guide his life career. Conceptual assumptions pattern his perceptions of the world and guide all his activities.

This view treats culture as a human way of living to which man aspires as he strives to actualize his ideas, beliefs, feelings, and emotions by patterning all his organic functioning, his selective awareness and perception, and his overt activities – especially his ways of relating to others.

If man is to transform the geographical world and his own organism, he needs ideas or concepts, beliefs, and expectations that enable him to select from the immense variety of nature whatever is relevant to and congruous with his aspirations. Likewise, if man is to develop purposive behavior and pursue goals of his own choosing, he must stabilize the flux of experience; that is, he must impose some order on the multiplicity of events that otherwise would continually distract and confuse him, diverting him from his purpose and frustrating his strivings. We may accordingly view a culture in terms of the basic concepts and assumptions by which its members order and pattern their experience and regulate their relations with situations, animals, other persons, and themselves. We should also recall that each cultural group has selectively recognized only some of the potentialities of the natural world and of human nature, cultivating, elaborating, and rewarding some while ignoring, rejecting, denying, and often sternly suppressing others. To put it another

way, we may think of the world as a myriad of To Whom It May Concern messages, as Norbert Wiener once suggested in a discussion on cybernetics. Through the evolutionary process, each species of organism has developed its specific concerns and thus has the capacity both to receive and to respond to the messages appropriate, if not essential, to its survival. We may view man as having extended his capacity for selectively receiving and responding to these messages, so that he can ignore or reject what seems irrelevant and thereby enlarge his organic functioning by creating a world of symbolic messages to which he has invented an enormous repertory of responses. Among these messages we should recognize the imaginative creations or concepts that we call science and art, which man has developed as templates for ordering experience and investing the world with meaning and significance. Culture is the product of man's fertile imagination translated by his skillful hands into a way of living.

These fundamental concepts are the major clues to an understanding of a given culture, especially of the symbolic character of that culture. One way of describing these concepts and basic assumptions for a given culture is to see the manner in which, in order to cope with the world and to establish a social order, its members have imaginatively created and cumulatively developed more or less explicit ideas about:[1] (1) the nature of the universe, how it arose, how it operates, and the deities or powers or forces believed to control the events to which man must relate himself; (2) man's place in that universe – his origin and destiny, his relation to the universe and its varied ongoing activities; (3) man's relation to his group life and to other persons; and (4) human nature, its limitations and potentialities.

Each of these reinforces and is reciprocally supported by the other three in such a way that a systematic or organized whole is maintained.

We may think of a culture as a figure created by human imagination on the ground of cosmic events – a figure maintained by the patterned behavior and aspirations of members of the cultural group, who inculcate their children with their own beliefs, regulating the children's behavior and thereby perpetuating their design for living. Exposed to all the varied aspects of the universe, each culture has sometimes excluded more than it has accepted or perceived. Over the ages some groups have enlarged this figure, gradually recognizing further aspects, which have enlarged their scope and activities, whereas other groups have continued their early design with few major additions or alterations.

This emphasis on the conceptual foundations of a culture, which have been formulated and expressed in its religion, art, myth, folklore, rituals, and, later, science, helps us to realize that a culture is essentially an artistic creation, a virtual world that man strives to main-

tain, much as Suzanne Langer has described it.[2] Moreover, this approach to culture indicates that people's overt behavior may be interpreted as a transactional process, as Dewey and Bentley have proposed.[3]

In a transactional relation the individual invests situations and people with meaning and then acts in accordance with the meaning he has imposed. This kind of relation differs from that of the familiar cause and effect, or its psychological equivalent – stimulus and response. It enables us to understand that what we call a culture operates primarily in the minds and hearts of people who produce the variety of artifacts, overt activities, and observable group and interpersonal relations, as these are patterned, guided, directed, channeled, and regulated by their creators' beliefs, aspirations, and feelings.

This concept of the transactional relation also gives us an understanding of how, in this world of physical, chemical, and biological processes operating uniformly all over the earth, different peoples have developed such amazingly different designs for living and such a wide range of beliefs about nature and human nature, including their images of themselves as peoples and as individual persons. Furthermore, it shows us that a cultural group achieves a large measure of internal coherence and integration because the group's beliefs, actions, and prohibitions, in all its activities and institutions, are governed by these basic assumptions and aspirations. What we call a social order arises from and is directed by these cultural traditions as they are translated into the customs, institutions, rituals, symbolic practices, and the roles and human relations by means of which individuals carry on their life activities.

As long as a group's customs remain unbroken, each member is guided by the unseen hand of tradition, which may or may not be congenial to his or her individuality, but which is reinforced by the expectations of others. Indeed, we may find one clue to the cohesiveness of a culture and the relative regularity of the behavior of its members in precisely these reciprocal relations into which each person must enter, using the prescribed symbols for communication – the language, gestures, and varied rituals, especially those rituals through which economic, political, religious, legal, and interpersonal affairs are carried on. No one is allowed to depart from or even deviate widely from these prescribed patterns, because such departures from the familiar and the conventional will be neither understood nor responded to by the others upon whom he is so largely dependent. This is what makes social change neither easy nor rapid.

It is therefore obligatory for an individual to think, speak, and act within the prescribed norms and patterns if he wishes to avoid group rejection, but each person may utilize these with some variation – with

his own idiomatic combinations and permutations. For this reason a group manifests recurrent regularities, but idiosyncratic behavior is found in the individual members of that group.

To participate in a social order, to live in the symbolic cultural world of one's fellows, one must not only use the expected patterns, but also evoke them from others; therefore, all intercourse and relations are circular, perpetuating the traditional design for living and sustaining the cultural organization. A culture or a social order may thus be seen as a self-perpetuating, self-regulating, and self-repairing organization that arises from the activities of all its constituents. Cultural patterns and social orders do change, however. We are still trying to understand the processes of alteration and hoping to guide them in order to attain a consciously chosen future. These processes, let it be emphasized, occur primarily in people. Too often we speak of social change as if it were a superhuman operation, something occurring above and beyond people, to which they can only submit, as Karl Marx so firmly believed.

Faced with the complex of events we call MIS, can we discover what cultural and social changes are likely to be evoked, and, what is more important, can we also learn more about the processes of change that may be initiated or accelerated by this complex?

Frequently we assume that social change is "caused" by new inventions and technology, forgetting that inventions are products of new ideas and conceptions – new ways of perceiving and thinking about the world, which are then translated into tools, techniques, or machines. Inventions or technological advances provide the occasion or necessity for further changes in behavior and group living, but they do not govern or determine what new patterns or directions the changes in behavior will take. For this reason no one could possibly have predicted the ramifications of the invention and development of the automobile or that it would be used in so many ways. Nor can we say that any one of these changes in our individual lives and in the life of the group was caused or determined solely by the coming of the automobile. People were presented with a new instrument for rapid travel, the product of imaginative thinking and technical knowledge. They began to use it in various new ways, which became ever more popular. These new uses of the automobile in turn made possible further changes in behavior and relationships, thus creating new problems and conflicts as the new patterns made the old ways less desirable or feasible or created personal and interpersonal conflicts.

The consequences of the automobile's invention bring up the distinction between convergent and divergent events as Langmuir has described them.[4] Convergent events are those that average out, giving a result that converges to a definite state, as we see in gas laws, which

state the relation of volume, temperature, and pressure. Divergent events are those that start from a small beginning and produce increasingly large results, as in quantum physics. Convergent events, as Langmuir has said,[4] conform to the older ideas of cause and effect, whereas divergent events must be approached in physics through quantum theory, and in social life as organized complexities, to use Weaver's terminology.[5]

Although much human behavior may be approached as convergent events that average out and can be studied as trends by actuarial methods, the behavior significant for cultural and social change is divergent, at least initially. This presents the problem of tracing, from a small beginning, the way in which increasingly large and widespread alterations in patterns of conduct and relations occur, especially the manner in which these fertile new events or inventions give rise to ever-enlarging changes in human living. The initial, small beginning is, I submit, a new idea, a new concept, or a new way of perceiving events that are the products of creative, disciplined imagination. When it is presented and interpreted to people, it operates in much the same way as an enzyme or catalyst, to activate questioning, discussion, controversy, and exploration. Some people will ignore it or fail to hear of it, some will try to apply it in a limited area of practice, while others will try it out on an ever-widening range of situations and relations. The new idea or concept may thus evoke as varied an array of responses as there are individual personalities that accept and utilize it in their own personal or social activities. Many will accept the technological product, but never grasp the concept that produced it.

Among those responsive to new ideas there are a few with sufficient imagination and skills to carry on the kind of thinking that first produced it and led to the new invention. Such people are the innovators who translate new ideas into practice, that is, into the many different ways in which an idea may become operational – in technology, art, education, and administration. The technological advances of the past few decades illustrate the process of the exploitation of new physical and chemical concepts for the production of an amazing array of new products and services.

How, we may ask, will the idea of MIS, now that it has become operational, function in our personal, cultural, and social life? Let us remember that the launching of the space satellite comes as the culmination of years of work, of experiments with rockets, balloons, and high-soaring aircraft, and of the many fertile ideas and concepts of aerodynamics that have been developed since 1900. In addition, the space satellite has been made possible by an extraordinarily rapid and all-embracing search for new materials, instruments, processes, and communications devices.

Although the launching of the first satellite and its successors marks a dramatic further step, it cannot be regarded apart from the scientific and technological developments of the past fifty years, beginning with the first airplanes. This cumulative process has been preparing us for MIS by a continuing enlargement of our ideas of what is possible and what we may expect. In this light we might regard the recent launching of a satellite by the Russians as happening in a fluid situation in which many events and predictions were suddenly precipitated. If the satellite had come as the atom bomb did, with little or no anticipation, or without the large build-up of expectations of the past few decades, which has been intensified since the Germans' use of guided missiles in World War II, then our present reactions could be attributed primarily, if not exclusively, to the satellite itself. Accordingly we should, in my opinion, embrace in the term MIS this whole complex of scientific and technological advances, which will dramatically culminate in the first manned rockets or space ships. Then man truly will be in space, beyond the restrictive domain of the earth's gravitational field. Let us look briefly at some of these scientific advances we are struggling to assimilate.

We should recognize that the classic concept of space has been radically changed by the concepts of space-time and of relativity enunciated some years ago, both of which, as purely scientific conceptions, may remain recondite mathematical operations for most of us, but which, as new ideas challenging our long-accepted assumptions, have become increasingly familiar and acceptable. What was once a radical proposal by mathematicians of the Nineteenth Century to develop a non-Euclidian geometry has become a scientifically acceptable and immensely fruitful mode of thinking about the universe in non-Euclidian terms. This has also become familiar to laymen.

Just how far it has altered our common assumptions and expectations would be difficult to assess. It is clear, however, that we have made a considerable change in our spatial perception of the world, as shown in recent painting. Many contemporary artists paint, as it were, from within a situation, showing simultaneously various aspects that can actually be observed only consecutively. Such paintings, and also our advertisements, which also reflect this new spatial perception of the world, have in turn altered our perceptions, making us ever more aware of space-time.

Concepts of time, too, have been revised in such a way that we are increasingly thinking of time in spatial terms: of rapid travel and communications, and also of the almost incredibly rapid operations of electronic apparatus and radiation in which transmission of impulses through space is beyond our visual imagination. With various apparatus such as the electron microscope and ultrafast cinematography, we are able to

explore the field of microscopic space relations and of continuous processes, stopping motion, as we say, and thereby gaining new concepts of space-time, while our greatly enlarged and more powerful telescopes, as well as the new radio apparatus for celestial reception of radio pulses, enable us to explore outer space.

We have just begun to realize how much of our scientific investigation, such as the study of the cadaver, as Woodger pointed out, is conducted in "timeless space." We are also recognizing that we have studied many events in spaceless time, realizing, as in stereochemistry, that the spatial location of an atom within the molecular configuration is crucial in that molecular behavior, as shown by isomers and organic molecules – for example, 17 ketosteroids or 24D. Indeed, the field concept is an assertion that whatever exists and happens occurs in a space-time configuration, both dimensions of which we must recognize.

The view that the universe has existed for billions of years and that it extends for millions of light years has recently replaced, not only the old religious cosmology, but also the familiar Newtonian concepts with an enormously enlarged space-time configuration. This change has been accompanied by a profound alteration in our scientific orientation to the world.

In the Nineteenth Century physics had developed a concept of the universe as a large-scale mechanism with rigid boundaries, operated by inexorable cause and effect, and having a tendency toward entropy. In this universe man was regarded as a helpless passive atom subject to enormous forces. This was generally accepted as an adequate, comprehensive way of understanding the universe, but not until Einstein enunciated his theory of relativity in 1905 was it realized that this earlier elegant theory provided no place in the universe for man, especially for the theorist himself. Since that date we have recognized that any conception of the universe is a human creation; in this way the observer has been restored to a central place in our scientific concept of the universe.

This profound change in our conception of man's place in the universe should be recognized, because it makes clear the way in which our ideas and beliefs about the universe give rise to man's image of himself, that is, his way of conceiving of both himself and his relations to the world.[6] Today we may speak of the rise of a new humanism primarily from scientific thinking, which is so often regarded as inhuman and destructive of man's sense of his own worth and dignity. Indeed, it is possible that the most far-reaching impact of MIS on our culture will be exhibited in man's image of himself; from this great achievement we may gain a new and vastly enlarged conception of human potentialities.

We may even develop a new sensibility from the realization of our common vulnerability to space hazards and threats and an awareness of the urgent need to become members of a world community.

If we seek indications of cultural change arising from these new ideas, now dramatically publicized by MIS, we should recognize that new concepts diffuse gradually through the thinking of a people. Our present ideas began with a more or less select few who resonated to the new ideas revealed in the late Seventeenth and Eighteenth Centuries. At that time Newtonian concepts were quickly accepted by the elite and translated into almost all fields of thinking and creative artistic work. Especially noteworthy is the manner in which those new concepts of the solar system and of physical events captured the imagination of the poets and the philosophers of the times, particularly the natural philosophers, who were the forerunners of physicists and chemists, and also of outstanding men such as John Locke, David Hume, Adam Smith, and Benjamin Franklin.[7-13]

How responsive to MIS will similar persons be today and how will the new ideas and assumptions about the universe that have been developed since 1900 become operative in their thinking, their activities, and their feelings? Obviously, the military forces and governmental officials have been concerned about prospects of exploring space. The discussions and disputes arising since the launching of the Soviet satellite issue from a group that has for some time focused on such factors as space travel and guided missiles, while others are expressing their fear of Soviet potentialities as revealed by the satellite. Much, if not most, of the clamor seems to be a release of feelings, or attempts to use the satellite for various personal, professional, and political advantages. Any similarly dramatic achievement of the Union of Soviet Socialist Republics in another field might provoke similar responses; hence, it is hazardous to consider these current outbursts and controversies as essential reactions to MIS. They are not cultural changes.

It is not unwarranted to say that the full impact of the new scientific developments is yet to come. Poetry, for instance, has not yet been stirred by the scientific imagination expressed since 1900; indeed, as a group, poets are more or less resistant if not antagonistic to science, which they still regard in its Nineteenth Century terms, as anti-human and mechanistic. Painters have assimilated, or perhaps have independently developed, new patterns of perception of space-time and motion; novelists have begun to write about MIS situations and, of course, science fiction has for years been anticipating it. A continual monitoring of the arts for indications of recognition of the new developments should be established; it promises a way of recording the cultural changes taking place, since the arts are usually the first to respond to cultural changes, if not to initiate them.

Today the rate of diffusion will probably be greatly accelerated by the larger number of literate persons capable of reading and discussing the new events, as well as by the immense range and capacity for communication now available in radio, TV, moving pictures, and the many illustrated magazines and journals having enormous circulations. If it were feasible, a study of the impact of these different media on different groups of people would be desirable, to see how effective they are in altering people's customary ideas and expectations. It is possible that many will learn the new terms we now use and will talk about these exciting events, but will not alter their familiar frame of reference or replace traditional beliefs with new assumptions. This sort of response is what makes the study of cultural change, as distinguished from alterations in overt activities and language, so difficult.

When we look for indications of how MIS is being accepted, understood, and incorporated into our beliefs about the world and about man, we may undertake inquiries such as interviewing people, opinion polling, and similar procedures for evoking responses focused by questions or by a topic or theme to be discussed. These procedures yield materials that can often be quantified according to the various classes or categories into which we divide the population.

It has been recognized in physics that the kind of information we get is determined by the kind of questions we ask. If we are interested only in quantity, we can simply poll people. In human affairs, however, the questions we ask may evoke replies contaminated by various extraneous ideas and feelings arising from the previous experience of the respondent, his present state or condition, including his emotional state or response to the topic, and frequently his judgment as to the purpose of the inquiries. Despite these problems, the results may be significant and useful, especially if we treat them as convergent events that average out.

Responses to a projective method are often more fruitful. With this method we provide an opportunity for the respondent to say what he sees, thinks, and feels about material that is usually less structured. Such responses to projective materials not only reveal more of individualized personality; they frequently also evoke the imagination of the respondent, thereby giving us insight into his private world. This private world is created by the manner in which the individual perceives the public world in his own idiosyncratic way; the common stock of ideas and perceptions appear, but they are always idiomatically combined and expressed with feeling of greater or less intensity.[14] To study cultural change we should scrutinize in various projective ways what people reveal, for the individual exhibits basic alterations or reorganizations of his personal frames of reference and his naive assumptions and expectations in his

own idiomatic way. For instance, people can buy and use all the modern gadgets and devices, cars, washing machines, refrigerators, TV, hi-fi, and airplanes, but still remain loyal to their ethnic-cultural traditions in marriage, child care, and food habits.

One approach to our problem is to view it as a communication situation. To do this, we may observe the series of messages being sent by the scientific and technological groups engaged in such activities as the actual operations of space exploration and the research, planning, and launching of rockets, missiles, and space ships, as reported through scientific publications and meetings. These messages are then relayed by a variety of interpreters to the public, which, in turn, decodes them and interprets them according to its customary beliefs and expectations.

In this approach we take into account the original scientific ideas, assumptions, specialized ways of thinking, and technical processes that lead to and produce MIS. These are specific and unambiguous, and can be recorded clearly.

We may then observe how these messages are picked up by a large number of listeners, each of whom, according to his previous experience, training, and occupational bias, will attempt to diffuse them through various media such as the following:

(1) Science articles in newspapers and journals; scripts dealing with the subject on radio and TV programs.

(2) Lectures and discussions by educators in schools at all levels and in adult education classes.

(3) Textbooks for each educational level.

(4) Advertisements using the new visual concepts and symbols as carriers of their own advertising messages to convey the ideas and assumptions of MIS to the public.

(5) Novels, plays, and TV dramas. These are already exploring the idea of man in space and delineating personality and human relations under the new conditions; the play, *Visit to a Small Planet*, by Gore Vidal is a good example.

(6) Paintings and commercial art. Much of the public's present-day perception of the world has been patterned by artists since 1905 in a manner similar to that of the painters of the Renaissance.

(7) Science fiction, which has already reached millions of readers with ideas about MIS, sometimes using valid concepts, more often fantastic ideas, but obviously creating a new climate of opinion and new expectations. Serious novels such as *The Curve of the Snowflake*, by W. Grey Walter, indicate what to expect.[15]

(8) Comic books, many of which are science fiction in visual form for younger readers.

(9) The toys and playthings bought by adults for children; these include some highly developed models and instruments.

(10) The preaching and teaching of ministers, priests, and rabbis, who will certainly use MIS in their sermons, warning their congregations of the spiritual dangers involved, the moral problems presented, or the new prospects and threats ahead.

Scientific and technical information will thus be encoded into a multiplicity of forms, each shaped for a specific medium, in the various attempts to communicate with a selected segment of the public audience. In this process, workers in each medium will modify, distort, enlarge, and otherwise interpret the initial message as they translate it into whatever has been selected as the appropriate version of the events for the special audience addressed.

As we have already seen, the Soviet satellite has evoked a great variety of pronouncements using that achievement to demand, among other things, more armaments and better missiles, more research and more scientists, better education and training, fiscal and economic readjustments, diplomatic alterations, and moral regeneration. Scarcely any aspect of contemporary life and opinion has escaped this sudden impact as each speaker or writer has used the occasion to expatiate on his chosen theme, using the satellite as a weapon for achieving his goals. This, it will be recalled, is what happened when the first atomic bomb was used; at that time a similar series of shots was fired from all sides, relating atomic bombs and atomic power to all current events and controversies, and using the event in support of various proposals. These reactions are not to be viewed as cultural changes.

MIS is likely to evoke even sharper and longer discussions as well as prophecies, since it will be a focus of attention and growing concern as each new step in missiles, satellites, and manned space ships is announced. Again, our task is to sift these to discover what basic changes may be taking place beneath these outpourings. It will be especially important to see how the churches respond and what changes they make in their traditional ideas and teachings.

The dramatic quality of MIS will enlist for these messages a large audience differentiated less by the usual categories than by a variety of criteria more difficult to apply. An adequate sample for opinion polling or interviewing on MIS may not be very useful if divisible into the customary categories – socioeconomic, political, religious, urban-rural, or even age and educational level or occupation. On the other hand, it is more likely to be informative if divisible by more subtle characteristics, such as those of the nonneurotic or neurotic, whose anxieties may be more or less aroused by MIS; or by strength of religious feelings and sincerity of convictions that may not be revealed by membership in a

sectarian or denominational group; or by the idea systems of persons, whether archaic, classical, or modern. These groupings will cut across the usual sampling groups.

One group, children – especially boys between six and twelve years old, and another group after puberty – should be observed to see if MIS is supplanting the older patterns of such figures as knights in armor and cowboys. Also worth investigating is the role of the man in space as the "good guy" or the "bad guy," or perhaps both, in the fantasies of children and in their story or comic preferences.

It is in such ways that, in the process of communication of MIS to the public, every message is subject to a variety of alterations and even serious distortions. Many of these secondary messages, we know, will be so embellished that their primary content will be almost beyond recognition, and they may often be presented visually and symbolically in such a manner as to be interpreted in many different ways.

Since all these messages are being sent in a world where there are numerous other messages in transit, specific messages about MIS will be subject to many distortions and defects due to this "noise." Included in this noise may be some efforts to "jam" the messages by those who feel disturbed by MIS and wish to block the public or a specific section of the public from receiving such messages. There will also be the inevitable conflicts and contradictions created by a variety of messages about MIS sent by different persons with different competence and intent. The inevitable redundancy in these messages may operate, not to clarify or reinforce, but to confuse their meaning, especially when MIS is used as an occasion for "putting over" or selling some extraneous idea or object, as advertisers are already doing to glamorize the appeal they are making. The association of rockets with national defense and especially the idea of vying with the Soviet Union over space satellites for military observation may color or warp large numbers of the responses to MIS.

Furthermore, we should realize that the receivers of these messages will further decode and interpret them in terms of their existing ideas and beliefs, their customary ways of thinking and feeling, and their usual criteria of credibility. Some people will eagerly weigh these messages and begin to think in the new terms, seeing the world with new possibilities. Others will accept them in part, acknowledging the actual MIS operations when reported, but will remain unwilling or unable to revise their usual expectations and assumptions. For instance, it was only recently that scientific research began to lose its connotations of the "House of Magic," as the General Electric Company formerly described its research division. Yet other persons will receive these messages with foreboding, feeling that man has again become insolently impious in defying the limitations placed on him by the Lord who created him as a terrestrial dweller until death.

The variety of these receptions and interpretations will be as numerous as are the number of idea systems and theological beliefs that people hold. We must remember that some still think in Aristotelian terms, some in pre-Copernican, and that most people still hold Newtonian concepts of the universe. We can expect that both new ideas and the actual events of MIS will be accepted and transformed into each person's pre-existing frame of reference. Only those who undergo a genuine alteration in their thinking, a conceptual reformulation such as is usually experienced only in a specific discipline in the graduate schools, will be able to accept and interpret the more reliable of these messages with any degree of understanding.

This introduces the crucial problem of unlearning. Early in childhood we develop our basic conceptual framework and our orientation to the world; it is then, when we learn to think about and to deal with space-time, gravitation, barometric pressures, and the relation of the earth to other planets and the stars, that we develop our repertory of expectations and behavior, and in those terms. MIS confronts us with the task of establishing a new climate of opinion, not by the slow and gradual process of education in which much of the old is carried on, especially in elementary and secondary schools, but by a far more dramatic process that will release people from their customary beliefs and assumptions about the world, helping them to unlearn the old and familiar so that they can relearn a new set of ideas and expectations more consonant with the lives we are trying to lead in an industrial civilization.

Since basic ideas are developed in early childhood and operate like other concepts to stabilize the world, it may be very difficult to alter them. The painful and slow process of psychoanalysis shows the difficulty involved. Can we devise techniques for rapid unlearning in these other areas, which usually have less personal intensity and emotional coloring but which, because they are cognitively crucial, are also difficult to revise?

For such an enterprise we should envisage a systematic operational research, not just to find out the actual facts, but to devise procedures for bringing about planned changes in our culture and in our social order.[16] For such operational research we shall need to organize teams of social scientists since no one discipline is competent to handle all the dimensions of the problem nor to devise the kind of processes that will be adequate for the full range of alterations in people's thinking, actions, and feelings. One phase of this would be to work out some concerted program for communicating to the public, which is now confused by the multiplicity of messages, advices, and exhortations. One source of valid scientific interpretation would serve as a reference against which all others might be judged or evaluated. This might well be the

office of the National Academy of Sciences, Washington, D.C., in concert with the Social Science Research Council, New York, N.Y., and the American Council of Learned Societies, Washington, D.C., with the American Association for the Advancement of Science, Washington, D.C., collaborating through Science Service, Washington, D.C., to provide public information similar to that of the program for the International Geophysical Year and to observe how these messages are received.

In many countries of the world systematic propaganda accompanied by coercive practices has been able to accelerate the breakdown of traditional ideas and to replace them, apparently to some extent, by a new set of ideas totally at variance with the old beliefs and patterns of behavior. This is forced acculturation. Other peoples have voluntarily relinquished old ideas, although not without some conflict and turmoil, accepting new concepts and developing a new design for living. This voluntary change has occurred among the Manus, according to Margaret Mead.[17] In our own country since 1900, we have altered our living habits, developed urbanism and new family living, and made other changes, but we have not given up many traditional beliefs and expectations that have become increasingly incongruous and self-defeating.

It is possible that we may accept space travel, change many of our living and working habits, accept extensive alterations in almost all our affairs, but still cling to older concepts, relying on ideas about nature, human nature, and social orders that derive from an earlier climate of opinion – indeed, from centuries ago.

It would be useful to discover which areas or aspects of a person's frame of reference or conceptual orientation are altered by MIS. Does he first modify or replace his concepts of the universe, the physical world of space-time, mass energy, and related scientific ideas? Does he enlarge his conception of human potentialities and change his beliefs about human nature? Does he accept new assumptions and expectations about human behavior and reconsider the traditional moral codes? Will he admit a need for revision of legislation? Can he tolerate departures from the traditional theological teachings, especially the many pronouncements on man's limitations and deficiencies, including the Biblical statements that man was created to live on earth? How far will the impact of MIS revive the old controversies generated by the theory of evolution and by the Copernican concept of the solar system, and what alterations will it necessitate in conceptions of Heaven and Hell?

Along with these inquiries should go efforts to discover what, if any, changes may be induced in our time perspectives and our formulation of our enduring goal values.[18] Will MIS stimulate a new level of aspiration, give rise to a new concept of the worth of the individual personality, a new meaning to the concept of human dignity, as modern science now promises?

It would be fruitful to discover at what point in their formal education children and youths are given some awareness of these new ways of thinking. Ordinarily the teaching of physics, chemistry, and mathematics is limited to the classic framework, the ideas developed prior to 1900, with the result that the younger members of society learn of the new climate of opinion from comics, science fiction, TV, movies, and other informal sources. Probably these same channels will also introduce the young to MIS, as they have already begun to do. It is possible that an introduction to MIS may be more feasible in nursery school than in elementary grades. This would bring an early recognition and acceptance of the idea, which otherwise might take many generations to attain.

Those who embark on space trips will be faced with the problem of supplanting their earliest formed patterns of organic functioning and motor coordination with new habits and practices – highly specialized patterns. Their basic body habits – breathing, swallowing, eliminating, sleeping, walking, sitting, and resting – must be altered in space travel. Their usual thresholds to various sensory stimuli and to emotional provocations must also be altered if they are to learn to accommodate themselves to the many unfamiliar conditions of space travel. Likewise, they will be cut off from many of the cues by which they orient themselves in time and space, with possible serious consequences for normal mental functioning and personality stability, as foreshadowed by recent experiments on the complete isolation of subjects.

Obviously the space voyager will not be able to continue his customary interpersonal relations. He may have to learn a new set of inhibitions for regulating his emotional reactions and his interpersonal relations, especially his tactual contacts with others.[19]

If we consider MIS as providing occasions for bold, imaginative explorations into the problems of unlearning and relearning, we might greatly advance our understanding of these processes. We might even discover methods for group unlearning with far-reaching possibilities for cultural and social change in those areas in which we are now burdened by so many anachronisms and archaic survivals.

The public will be curious about these activities and will speculate on how the space voyager will manage these personal functional processes, including the sexual. People will speculate as to what will happen to a man's wife and children when he embarks on a prolonged space trip, perhaps for years, with every chance of not returning. How long a separation in space would justify divorce and, if he should return, how will this Enoch Arden triangle be handled?

The response to the question, "Would you go on a space voyage if invited?" will probably evoke some highly significant replies from those who are eager to get away from this troublesome world or to try their

courage and endurance in a new and untried area of living. It will be difficult to distinguish such people as the neurotic, the near-psychotic, the adventurer, the bored-with-life, and the escapee from unwelcome obligations from all who are eager for space travel. Such distinctions might be facilitated by interviewing for sufficient identifying statements.

As the history of ideas and religions indicates, the emergence of new ideas and exposure to novel situations evokes from people a process of assimilation and accommodation whereby they try to fit the new into the old framework of their traditional beliefs and activities. It would contribute to our studies of the reception of MIS if we were to study the process of accepting, modifying, distorting, and encapsulating the new concepts that have evolved from modern physics during the past fifty or sixty years. It is clear that MIS has become feasible only through the development of concepts, modes of thinking, and criteria of credibility radically different from the former climate of opinion, which included such factors as classic physics, the traditional beliefs about matter, energy, space, time, and human nature and its potentialities. The way in which these new ideas and modes of thinking have been ignored by people who are enjoying the many products and services arising from them offers a fruitful approach to MIS viewed as the latest in a long series of new ideas and more fertile concepts.

We must remember that MIS is being introduced to a culture characterized by many anachronistic beliefs and archaic survivals. Will MIS create even more anachronisms, or will it evoke a large-scale reorganization and bring about a modernization of the human mind? This, I submit, may be the crucial issue, an issue we should not overlook in our proposed investigations of people's reactions to MIS and the alterations that may be evoked in their ideas and feelings. We need to discover what long-term persistent cultural changes are taking place that may be obscured by people's reactions to current events and social issues, such as the new satellite and defense preparations. Manifestations of such persistent changes should be sought in law, education, religion, the arts, and literature.

The permeation of our culture by MIS will take place basically through the arts and literature, as has happened in previous periods when new ideas were translated by artists and poets into form, language, and feelings that were generally understandable and acceptable. Long before the underlying concepts of MIS have been understood and accepted, their meaning will have been interpreted through the arts, as we are already seeing in advertisements, in comics, and in science fiction.

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SUMMARY AND RECOMMENDATIONS

By

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and

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With the recent launching of the first satellite, man has embarked on new experiences that will gradually be extended until man and his world are inextricably enmeshed in the activities and consequences of his evolution into space. The series of steps that will be taken during this evolution will produce an impact providing a unique set of circumstances for studying the history and processes of cultural change. These will be displayed in the broader aspects of society and also in the changing values, attitudes, and behavior of individuals.

Two factors integral to man in space (MIS) provide an extraordinary opportunity for studying sociocultural change. The first is the fact that the evolution of MIS will occur gradually enough to permit many series of investigations over a period of time. The second factor is the limited accessibility of advance information on particular developments in MIS. This will permit the use of the before-and-after type of research so important for the accumulation of scientific information, which is, in other circumstances involving cultural change, difficult or impossible to attain.

The very fact that planned research into the processes of sociocultural change is possible by means of MIS implies that the implementation and maintenance of an efficient and rewarding effort requires the assistance of a formal organization. Such an organization would provide a clearing house for data and concepts applicable to both the evaluation of previous research and the design of further research on the dynamics of change.

On the basis of the foregoing papers and the suggestions made by those attending the meeting at which they were read, the following recommendations for further action are proposed:

(1) It is highly desirable that a focus for research on MIS be established with full sanction and the widest possible backing of the organizations either generally or particularly responsible for the development of ideas in the sciences, scholarship, and the arts, and for the application of these ideas to various aspects of human life such as medicine, education, industry, the armed services, and the creative arts.

(2) The proposed organization should be fully prepared to communicate with pertinent international nongovernmental organizations,

international scientific organizations, and agencies of the United Nations, as well as with special cooperative efforts such as the International Geophysical Year.

(3) The immediate requirement for further research, if this unique opportunity for advancing our understanding of cultural change is not to be further dissipated, is the establishment of a multipurpose clearing house, a formal organization comprising a working staff, and backed by a responsible, useful, and representative research committee. The organization would: (a) stimulate and inaugurate research in appropriate institutions in this and other countries; (b) provide interested parties with information concerning forthcoming efforts in MIS, which would permit and facilitate the design of before-and-after studies pertaining to sociocultural change; (c) encourage and support conferences for the integration of new data pertaining to social change into fruitful theory and hypotheses; and (d) receive funds for its operating maintenance and for the support of special research or conference activities.

(4) The organization should have a small working staff adequately financed for travel and for special research efforts, in addition to the fulfillment of the functions set out in recommendation 3, above. The organization should not become top-heavy, nor should it compete with other institutions for prestige and attention.

(5) Areas of research should include: (a) public responses to events in the MIS area, to be derived from interviews with the general public and from observing the behavior of local leaders; (b) special segments of public opinion such as natural scientists, engineers, scholars remote from immediate technological developments, the clergy, legislators, and school children; (c) expressions of MIS in the fine and popular arts to discover in what ways the arts are alerting man to the implications of MIS and in what ways they are stultifying his abilities to recognize its unique aspects; (d) the specific problems of space travel, including analysis of material on partially comparable situations such as exploration, submarine environments, life in hazardous and lonely outposts, situations requiring close and protracted collaboration; and (e) the development of newer and more sensitive instruments for the detection of significant individual differences, in addition to the determination of psychological and physical tolerances for the physical stresses of space.

(6) The effect of MIS on human beings' changing conception of political and economic behavior throughout the world.

APPENDIX: QUESTIONNAIRE FOR SATELLITE STUDIES

By Donald N. Michael

The questions listed below are not meant to be exhaustive or definitive. However, questions such as these should form the basis for some satellite studies because the subject matter encompassed by them would seem to be requisite for many subsequent studies in which knowledge of the states of mind at or near the time of the satellite launchings would be required.

The questions, as stated, are open-ended. They could, of course, be transformed into the check-list type or the fill-in-the-blank type, among others. (For example, instead of asking, "What is centrifugal force?", one could use the unfinished statement: "The pull of gravity is balanced, so that the planets do not fall into the sun, by _____.")

(1) What is an artificial moon or space satellite?
(2) How is it that, once the artificial moon enters its orbit, it will not go farther out into space or immediately fall back to earth?
(3) Why do you think we wish to put up an artificial moon?
(4) What kinds of things will we learn from an artificial moon?
(5) Do you think there is intelligent life elsewhere in the universe? If "Yes," why?
(6) Do you think it will or will not be possible for men to reach the moon? If "Yes," when?
(7) About how big is the moon as compared to the earth?
(8) About how far away is it?
(9) About how big is the sun as compared to the earth?
(10) About how far away is it?
(11) How does a rocket work (that is, what makes it fly)?
(12) What do the following words mean: orbit, star, centrifugal force, planet, ellipse, thrust (as regards machinery), Alpha Centauri, telemetering, cosmic rays, Saturn, gravity, weightlessness, acceleration, thermal barrier, and 5 g's acceleration?

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